CLAIMS

1. A method for increasing opacity of paper, said paper manufactured by drying a furnish mixture of an aqueous pulp slurry and preselected fillers, said method comprising incorporating into said furnish mixture a multiple phase calcium silicate hydrate composing fushagite and xenotalite said multiple phase mixture having a fibrous crystalline structure comprising fushagite of a diameter of from about 0.1 to about 0.2 microns, and a length ranging from about 2 microns to about 5 microns, and xenotalite particles have a diameter of 0.1 to 0.3 microns and a length of from about 1 micron to about 3 microns.

2. The method as set froth in claim 1, wherein in said multiple phase calcium silicate hydrate has a water absorption characteristic of at least 400 percent.

3. The method as set forth in claim 2, wherein said multiple phase calcium silicate hydrate has a water absorption characteristic of at least 800 percent.

4. The method as set forth in claim 1, wherein said multiple phase calcium silicate hydrate has a water absorption of from about 500 percent to about 1000 percent.

5. The method as set forth in claim 1, wherein said multiple phase calcium silicate comprises a unique X-ray diffraction pattern, with a first calcium silicate hydrate component having a major peak at d=2.97 Å, and a median peak at d=2.31 Å, and a minor peak at d=5.05 Å, and with a second calcium silicate hydrate component having a major peak at d=3.11 Å, a median peak at d=1.75 Å, and a minor peak at d=3.66 Å.

6. The method as set forth in claim 1, wherein said multiple phases calcium silicate hydrate comprises a stable secondary particle, said stable secondary particle comprising an interlocking structure of primary fibrous crystals.

7. The method as set forth in claim 6, wherein said stable secondary particle comprises a porous haystack like structure of average diameter from about 10 to about 40 microns.

8. The method as set forth in claim 1, or in claim 5, wherein said multiple phase calcium silicate hydrate comprises a mixture of fushagite and xenotalite.

9. The method as set forth in claim 8, wherein the percentage of fushagite is at least seventy (70) percent.

10. The method as set forth in claim 8, wherein the percentage of fushagite is at least eighty (80) percent.

11. The method as set forth in claim 8, wherein the percentage of fushagite is at least ninety (90) percent.

12. The method as set forth in claim 1, or in claim 5, wherein said multiple phase calcium silicate hydrate comprises a hydrothermal reaction product of an aqueous suspension of lime and a siliceous material in a CaO to SiO2 mole ratio of between 1.2 to1 to 1.7 to 1.

13. The method as set forth in claim 1 or in claim 5, wherein said multiple phase calcium silicate hydrate comprises a hydrothermal reaction product of an aqueous

suspension of lime and a siliceous material in a CaO to SiO2 mole ratio of about 1.35 to 1.

14. The method as set forth in claim 1 or in claim 5, wherein said paper has a Gurley porosity, and wherein in said Gurley porosity is simultaneously increased along with said bulk and with said opacity.

15. The method as set forth in claim 1 or in claim 5, wherein said paper has a measurable smoothness, and wherein in said measurable smoothness is simultaneously increased along with said bulk and with said opacity.

16. The method as set forth in claim 1 or in claim 5, wherein said paper has a measurable print show through, and wherein in measurable print show throw is decreased while simultaneously increasing bulk, opacity, porosity, and smoothness.

17. A paper composition containing an effective amount of a filler, said filler comprising a multiple phase calcium silicate hydrate comprising foshagite and xonotlite, and having peaks in the XRD patterns from the fushagite and

xenotalite components in the complex having the characteristic XDR shown in FIG. 1.

18. A paper composition according to claim 17, wherein said multiple phase calcium silicate hydrate has a water absorption range of at least about 500 percent.

19. A paper composition according to claim 17, wherein said multiple phase calcium silicate hydrate has a water adsorption range of up to approximately 1000 percent.

20. A process for producing a highly absorbent coating formulation for facilitating printing a paper substrate, said coating formulation produced by combining an effective amount of calcium silicate hydrate and an aqueous starch solution to form a coating mixture, adding a dispersant to said coating mixture, and adding a binder to said coating mixture, wherein said CSH comprises a multiple phase calcium silicate hydrate comprising foshagite and xonotlite, and having peaks in the XRD patterns from the fushagite and xenotalite components in the complex having the characteristic XDR shown in FIG. 1

21. A slurry of calcium silicate hydrate consisting essentially of the fibrous primary crystals interlocked in secondary particles of calcium silicate as defined in claim 1 and dispersed in water.

22. A slurry of calcium silicate crystals as defined in claim 21 in which contains the water is present in an amount of 80 percent or more by weight in said slurry.

23. A slurry of calcium silicate crystals as defined in claim 22 wherein at least about 95% of the secondary particles are less than 40 microns in outside diameter.

24. A slurry of calcium silicate crystals as defined in claim 23 wherein at least about 80% of the secondary particles are 10 to 40 microns in outside diameter.

25. A method for producing high stiffness paper, said paper manufactured by drying a furnish mixture of an aqueous pulp slurry and preselected fillers, said method comprising incorporating into said furnish mixture a multiple phase calcium silicate hydrate composing riversideite and xenotalite said multiple phase mixture

having a irregular globular structure having an outside diameter from about 10 to about 30 microns.

26. The method as set forth in claim 25, wherein in said multiple phase calcium silicate hydrate has a water absorption characteristic of at least 250 percent.

27. The method as set forth in claim 25, wherein said multiple phase calcium silicate hydrate has a water absorption characteristic of between 200 and 500 percent.

28. The method as set forth in claim 25, wherein said paper has a measurable stiffness and a measurable bulk, and wherein in said measurable stiffness is simultaneously increased along with said bulk.

29. The method as set forth in claim 25, wherein said paper has a measurable print show through, and wherein in measurable print show throw is decreased while simultaneously increasing bulk and stiffness.

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